RIVER STAGES AND FLOODS

By BENNETT SWENSON

Extensive flooding, mostly confined to the latter part of December, covered most of the eastern half of the country and Oregon. The principal features were: (1) the damaging floods in the upper Ohio River basin and below, including floods in the Tennessee and Cumberland Rivers and tributaries to the Ohio in West Virginia and Kentucky; (2) damaging floods in the Willamette River in Oregon; (3) considerable flooding in Alabama, Oklahoma, Arkansas, Kansas, Missouri, central New York and eastern Pennsylvania.

St. Lawrence drainage.—A general break-up of ice in the rivers in lower Michigan and in northern Indiana and Ohio during the latter part of December was followed by high water and some flooding. Precipitation had been above normal in October and November and in the form of rain until the close of November when heavy snow occurred. The weather remained cold in December until the 23d, and practically all of the streams froze over. Mild temperatures followed and continued until the end of the month. Heavy rains, approximating 2 inches, fell on the 26–27th.

The combined action of the mild temperature and the heavy rains melted the snow-cover and removed the frost in the ground. A high rate of run-off resulted in rapidly rising stages and several ice jams were formed. No material damage was reported from the overflows.

Atlantic Slope drainage.—The rivers in Maine were below the normal stage and the ice was unusually thick, 15 to 18 inches from Lewiston to Rumford, Maine. Snow depths of 20 to 24 inches in the State were reported with a water equivalent of about 4 inches.

Ice in the Connecticut River at Hartford, Conn., which was 10 inches thick, broke up and floated out as the result of light to moderate rains from December 29 to 30. Most of the rain froze as it fell and caused only a minor rise in stage in the main river.

Somewhat similar conditions prevailed over the Hudson River basin. A rapid rise took place in the river at Albany, N. Y., during the night of December 30–31, exceeding flood stage by 1.2 foot. The rise was due largely to the formation of ice gorges in the Mohawk River and their release. The average precipitation over the Mohawk Basin was 4 inches during December 27–31, but was mainly in the form of freezing rain.

Minor flooding occurred in the Delaware River basin as the result of practically continuous rains from December 27–30. Flood stages were exceeded in the Lehigh and Schuylkill Rivers and in the Delaware River at Easton, Pa. The moderately light snow-cover present over the basin was depleted by the rains which averaged about 3 inches over the basin.

Rains averaged from 3.5 to 5 inches over the Susquehanna River basin during the last 4 days of December. These rains falling on a light to moderate snow-cover, resulted in moderately severe flooding in much of the basin. The stage reached at Binghamton, N. Y., was the highest since the record flood of March 1936. In most of the remainder of the basin, the crest stages during this flood period were the highest since April 1940, and the second highest since March 1936.

A moderate rise occurred in the Potomac River during the last few days of the month. Flood stage was reached or exceeded slightly at Cumberland, Md., Harpers Ferry, W. Va., and at Washington (near), D. C. The Shenandoah River reached only moderate stages. A light to moderate snow-cover in the upper Potomac resulted in high run-off rates, especially above Cumberland from the moderate rains which occurred. For the period December 27–30, the rainfall average 1.85 inches over the entire basin, of which 1.25 inches occurred during a 24-hour period of the 29–30th.

Stages in the James River basin remained at low stages until the 29th, when moderately heavy rains caused a rapid rise. Flood stages in the main river were exceeded at a few points. At Richmond, Va., a stage of 10.6 feet was reached on the 31st.

The Roanoke, Saluda, and Broad Rivers in South Carolina, and the Savannah, Ocmulgee, and Oconee Rivers in Georgia experienced rises late in the month, reaching, or exceeding, flood stage slightly at a few points.

East Gulf of Mexico drainage.—A general rain from December 27–29 extended over the entire drainage. The heaviest precipitation was centered over Alabama. In the Cahaba River watershed, where the maximum rainfall occurred, the average precipitation above Centerville, Ala., on December 27–28, was 8.5 inches, and above Marion Junction, Ala., 7.2 inches, with a maximum amount reported of 10.05 inches. Other basins in the Alabama River system had averages as follows: Etowah basin, 3.6 inches; Oostanaula basin, 4.7 inches; and Tallapoosa basin, 3.4 inches. In the Coosa basin between Rome, Ga., and Gadsden, Ala., the rain averaged 6.4 inches, while the average over the basin above Gadsden was 4.9 inches.

Amounts were also heavy in the Black Warrior-Tombigbee watershed, the average for the entire basin being estimated at 5 inches. Maximum amounts in this basin were 10.15 inches at Lock No. 2 in the lower Tombigbee, and 9.4 and 8.6 inches, respectively, at Birmingham and Oneonta, Ala., in the upper Black Warrior watershed.

Considerable flooding occurred in the Cahaba basin. The crest stage reached at Centerville was 34.8 feet, compared to a stage of 36.6 feet in the flood of April 8, 1938, and 35.3 feet in February 1936. In the Alabama River, the crest at Montgomery was 41.1 feet, compared to 57.1 feet in 1919, and at Millers Ferry, Ala., 47.4 feet, compared to 51.8 feet in 1933.

The flood in the Black Warrior and Tombigbee Rivers generally was not severe. At Tuscaloosa, Ala., the Black Warrior crested at 60.5 feet, 8 feet under the record stage in 1900. The Tombigbee River did not reach flood stage in the reaches above its junction with the Black Warrior, and below the crests were generally more than 10 feet lower than the record stages.

Light to moderate floods in the Pearl and Pascagoula Rivers caused no damage of consequence.

Mississippi System.—Heavy rains on December 26–27, extending from eastern Iowa southward and south-southwestward into Missouri, Arkansas, eastern Kansas, and eastern Oklahoma, resulted in extensive flooding in those areas. The floods were not unusually severe, but in some cases were the highest of record for December principally in the Gasconade, Meramec, and Osage Rivers in Missouri and in the White River basin in southern Missouri and northern Arkansas.

Ohio River basin.—Moderately heavy rains in the upper Ohio basin, combined with melting snow to produce the highest December flood of record and the third highest in the past 100 years at Pittsburgh, Pa. The Scioto, the Wabash, tributaries in West Virginia and Kentucky, the Cumberland and the Tennessee were also in flood. Heavy rains were confined largely to the extreme southern portion of the Ohio basin, while over

the remainder of the basin moderately heavy rains and melting snows caused the flooding.

In the upper Ohio River, the crest stages were lower than the March 1936 stages, whereas in the middle and lower reaches the crests in this flood closely approached or exceeded the 1936 crests, but were well under the January 1937 crests.

As the flooding continued at the close of the month, a further report will be made in a later issue of the REVIEW.

Pacific Slope drainage.—Excessive flooding, accompanied by considerable damage, occurred in the Willamette River basin at the close of the month. A report on this flood will be made in a later issue of the REVIEW.

FLOOD-STAGE REPORT FOR DECEMBER 1942

[All dates in December unless otherwise specified]

River and station	Flood stage	Above flood stages—dates		Crest	
		From—	To—	Stage	Date
ST. LAWRENCE DRAINAGE					
Lake Michigan					
Red Cedar:	*Feet*			*Feet*	
Williamston, Mich.	7	28	28	[1] 8.0	28
East Lansing, Mich.	8	28	30	9.3	29
Lake Huron					
Shiawassee: Owosso, Mich.	7	28	29	7.4	28
Lake Erie					
St. Marys: Decatur, Ind.	13	28	28	13.4	28
St. Joseph:					
Montpelier, Ohio	10	28	31	13.3	29
Fort Wayne, Ind.	12	28	(2)	13.6	31
Maumee: Fort Wayne, Ind.	15	28	30	16.9	28–29
ATLANTIC SLOPE DRAINAGE					
Hudson: Albany, N. Y.	11	31	31	12.2	31
Schuylkill:					
Reading, Pa.	13	30	30	13.1	30
Philadelphia, Pa.	10.5	30	30	11.4	30
Lehigh: Lehighton, Pa.	7	30	(2)	9.4	30
Delaware: Easton, Pa.	22	31	31	22.5	31
Tioughnioga: Whitney Point, N. Y.	12	30	(2)	16.6	31
Chenango:					
Sherburne, N. Y.	8	30	31	10.0	30
Greene, N. Y.	8	29	(2)	14.3	31
Binghamton, N. Y.	16	30	Jan. 2	24.0	31
Chemung:					
Corning, N. Y.	16	30	31	17.65	30
Elmira, N. Y.	12	30	31	17.4	31
Chemung, N. Y.	12	30	Jan. 1	19.0	31
West Branch:					
Clearfield, Pa.	10	30	31	11.15	30
Renovo, Pa.	16	30	31	17.8	30
Williamsport, Pa.	20	30	Jan. 1	23.0	31
Little Juniata: Spruce Creek, Pa.	7	29	30	10.5	30
Juniata:					
Huntingdon, Pa.	12	30	30	12.1	30
Mapleton Depot, Pa.	20	30	31	20.9	31
Susquehanna:					
Oneonta, N. Y.	12	29	31	[1] 18.15	31
Bainbridge, N. Y.	12	30	Jan. 1	20.7	31
Binghamton, N. Y.	14	30	Jan. 2	20.0	31
Vestal, N. Y.	14	29	Jan. 2	27.4	31
Towanda, Pa.	16	30	Jan. 2	23.3	31
Wilkes Barre, Pa.	22	30	Jan. 2	29.6	Jan. 1
Danville, Pa.	20	31	Jan. 2	24.0	Jan. 1
Sunbury, Pa.	16	31	Jan. 2	19.25	Jan. 1
Harrisburg, Pa.	17	31	Jan. 2	19.4	Jan. 1
North Branch of Potomac: Cumberland, Md.	17	30	30	17.1	30
Potomac:					
Harpers Ferry, W. Va.	18	31	31	18.0	31
Washington (near), D. C.	10	31	Jan. 1	13.1	31–Jan. 1
James:					
Bremo Bluff, Va.	19	30	Jan. 1	21.9	30–31
Columbia, Va.	10	29	(2)	24.0	31
State Farm, Va.	12	30	(2)	15.1	31
Richmond, Va.	8	31	Jan. 2	10.6	31–Jan. 1
Roanoke:					
Randolph, Va.	21	31	31	23.0	31
Weldon, N. C.	31	31	(2)	------	------
Saluda: Pelzer, S. C.	6	29	Jan. 1	10.0	31
Broad: Blairs, S. C.	14	30	31	17.5	31
Savannah: Butler Creek, Ga.	21	30	(2)	------	------
Ocmulgee: Macon, Ga.	18	29	29	18.0	29
Oconee: Milledgeville, Ga.	20	29	31	22.5	30

See footnotes at end of table.

FLOOD-STAGE REPORT FOR DECEMBER 1942—Continued

River and station	Flood stage	Above flood stages—dates		Crest	
		From—	To—	Stage	Date
EAST GULF OF MEXICO DRAINAGE					
Oostanaula:	*Feet*			*Feet*	
Resaca, Ga.	22	29	Jan. 3	30.0	31
Rome, Ga.	25	29	Jan. 3	29.9	31
Etowah:					
Canton, Ga.	17	30	31	19.0	30
Cartersville, Ga.	18	29	31	24.8	30
Coosa:					
Mayos Bar, Ga.	28	30	(2)	[1] 33.6	31
Gadsden, Ala.	20	28	(2)	26.9	30
Lock No. 4, Lincoln, Ala.	17	29	Jan. 4	25.3	29
Childersburg, Ala.	20	29	Jan. 1	26.35	30
Wetumpka, Ala.	45	------	------	44.4	31
Cahaba:					
Centerville, Ala.	23	28	31	[1] 34.75	28
Marion Junction, Ala.	36	30	Jan. 2	41.5	30
Alabama:					
Montgomery, Ala.	35	30	Jan. 3	41.1	Jan. 1
Selma, Ala.	45	------	------	44.6	Jan. 2
Millers Ferry, Ala.	40	31	(2)	[1] 47.4	Jan. 4
Black Warrior:					
Lock No. 10, Tuscaloosa, Ala.	47	28	Jan. 2	60.5	30
Lock No. 7	35	29	Jan. 7	50.9	Jan. 2
Tombigbee:					
Lock No. 4, Demopolis, Ala.	39	29	Jan. 8	49.8	Jan. 4
Lock No. 3	33	28	Jan. 10	51.3	Jan. 5
Lock No. 2	46	29	Jan. 9	52.4	Jan. 5
Lock No. 1	31	29	Jan. 12	35.8	Jan. 9
Chickasawhay: Shubuta, Miss.	30	29	29	30.7	29
Pascagoula: Merrill, Miss.	22	31	Jan. 4	23.0	Jan. 2
Bogue Chitto: Franklinton, La.	11	29	31	16.1	30
Pearl:					
Jackson, Miss.	18	28	Jan. 4	22.5	28
Monticello, Miss.	15	28	Jan. 1	20.2	29
Columbia, Miss.	17	29	Jan. 2	19.0	31
Pearl River, La.	12	30	(2)	15.6	Jan. 2
MISSISSIPPI SYSTEM					
Upper Mississippi Basin					
Rock: Moline, Ill.	10	27	Jan. 6	13.0	29
Skunk: Augusta, Iowa	15	27	28	15.7	27
Des Moines: Eddyville, Iowa	15	29	29	15.6	29
Salt: New London, Mo.	19	27	30	24.3	29
Illinois:					
Morris, Ill.	13	28	(2)	18.0	28
Peru, Ill.	17	28	(2)	21.1	29
Havana, Ill.	14	31	(2)	------	------
Beardstown, Ill.	14	29	(2)	------	------
Bourbeuse: Union, Mo.	12	28	31	19.0	29
Meramec:					
Sullivan, Mo.	11	27	30	25.1	28
Pacific, Mo.	11	27	(2)	24.6	30
Valley Park, Mo.	14	27	(2)	28.7	30
Mississippi:					
Hannibal, Mo.	13	28	28	13.0	28
Louisiana, Mo.	12	19	31	13.0	29
Grafton, Ill.	18	30	(2)	18.9	31
Chester, Ill.	27	30	(2)	------	------
Missouri Basin					
Grand:					
Chillicothe, Mo.	18	27	30	27.9	28
Brunswick, Mo.	12	29	(2)	13.7	31
Osage:					
Quenemo, Kans.	30	28	28	31.0	28
La Cygne, Kans.	25	29	29	27.0	29
Osceola, Mo.	20	28	(2)	25.0	30
St. Thomas, Mo.	23	28	(2)	27.2	30–31
Gasconade: Jerome, Mo.	15	27	31	25.4	28
Missouri:					
Hermann, Mo.	21	28	(2)	24.0	30–31
St. Charles, Mo.	25	28	(2)	29.0	31
Ohio Basin					
Allegheny:					
Olean, N. Y.	10	30	Jan. 1	13.5	31
Warren, Pa.	12	30	31	13.0	31
Franklin, Pa.	17	30	31	18.25	30
Parkers Landing, Pa.	20	30	31	21.8	30
Lock No. 8, Mosgrove, Pa.	24	29	Jan. 2	32.9	30
Lock No. 5, Schenley, Pa.	24	29	Jan. 2	37.3	30
Lock No. 4, Natrona, Pa.	24	29	Jan. 2	34.3	30
Lock No. 3, Acmetonia, Pa.	25	29	Jan. 1	35.5	30
West Fork: Clarksburg, W. Va.	5	29	30	5.4	30
Youghiogheny: Confluence, Pa.	12	30	30	12.2	30
Monongahela:					
Lock No. 7, Greensboro, Pa.	30	30	31	31.4	30
Lock No. 4, Charleroi, Pa.	30	30	31	33.4	30
McKeesport, Pa.	20	30	31	20.1	30
Muskingum:					
Lock No. 7, McConnelsville, Ohio	22	31	31	22.1	31
Lock No. 3, Lowell, Ohio	25	31	31	26.7	31
Little Kanawha: Creston, W. Va.	20	30	(2)	23.75	30
Hocking: Athens, Ohio	17	31	(2)	18.1	31
Kanawha: Red House, W. Va.	46	31	31	46.0	31